

# What New Knowledge Would Help Policymakers Better Balance Investments for Optimal Health Outcomes?

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**Objective:** Review the limitations in cross-sectoral health outcomes research and suggest a future research agenda.

**Data Sources, Study Design, Data Collection:** Literature review and workshop discussion.

**Principal Findings:** The research evidence that would aid public and private policy makers in answering the question the title poses is quite limited.

**Conclusions:** Much more evidence from diverse disciplines is needed, and key areas are suggested. Criteria for progress by 2010 are proposed.

**Key Words.** Health outcomes, population health, health determinants, cross-sectoral, cost-effectiveness

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“How much, then, should go for medical care, and how much for other programs affecting health such as pollution control, fluoridation of water, accident prevention, and the like? There is no simple answer, partly because the question has rarely been explicitly asked.” Victor Fuchs wrote this sentence in his 1974 book *Who Shall Live?* (Fuchs 1974). In this same period, Michael Grossman published his seminal work on the health production function, which elucidated from one theoretical perspective how some determinants of health might interact to produce health outcomes (Grossman 1972). Twenty-five years later there is a growing scholarly and policy appreciation that producing health comes from much more than medical care, and that optimizing health outcomes requires a balanced investment strategy across all determinants (Evans and Stoddart 1990).

Yet although many studies have been undertaken on many aspects of this question, we have not managed to produce convincing evidence of attribution, connection, and precise relationships that would be useful to public and private policy makers in attempting to allocate resources to improve health outcomes (Kindig 1997). This includes being able to clarify

what might produce more immediate results and what will require a longer period of time for impact. Indeed, one state health official recently said to one of us "If you can't tell me the relative causal impact of medical care and education spending on the health of the citizens of the state, your studies and opinions are of no help to me in discharging my political responsibilities" (J. Leann 1999, personal communication). On the other hand, other policy-makers say that even if researchers can calculate relative causal impact, it will still be difficult to change the politics of population health accordingly.

Gross estimates have been made, such as those by Lee and Paxman (Lee and Paxman 1997) in which 80 percent of premature mortality is said to have socioeconomic underpinnings, with behavior and lifestyle accounting for 50 percent, environmental exposure 20 percent, and health care 10 percent; similar estimates of the "impacts of various domains on early deaths" are made by McGinnis and colleagues of 30 percent genetic predisposition, 15 percent social circumstances, environmental exposure 5 percent, behavioral patterns 40 percent, and shortfalls in medical care 10 percent (McGinnis, Williams-Russo, and Knickman 2002). The degree to which these estimates are increasingly cited are testimony to the need for such information, but the empiric basis for them is far from complete and adequate. In addition, they provide little guidance for the relative cost effectiveness of policy interventions, in either the short or long run.

This article attempts to respond to this need. Its purpose is to stimulate research to produce knowledge about cross-sectoral relationships that might be useful to inform policymakers as they develop and implement policies for population health improvement. We do not here establish such relationships but reiterate and emphasize this residual gap between knowing that there are

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relationships and knowing exactly the order and weight these relationships take. We consider such sectors and factors to be medical care, public health, income and income maintenance, education, land use, air and water quality, agriculture and food processing, housing, social cohesion, political stability, and economic development. We define cross-sectoral to be explicit coordination or reallocation of resources in order to achieve a benefit in maintaining or improving health status for a population.

It is not that there have not been important studies and reports about these multiple determinants of health. For example, there have been various studies of poverty and its implications for health throughout the twentieth century such as the Black (Black et al. 1980) and Acheson (1998) reports in the United Kingdom as well as the Whitehall studies establishing the importance of the socioeconomic gradient in mortality (Marmot et al. 1978). The Canadian LaLonde Report highlighted the importance of risk factors and prevention in health outcomes, and the Population Health Group of the Canadian Institute for Advanced Research (Evans, Barer, and Marmor 1994) has brought significant attention to broader concepts of health outcomes and balancing investments across determinants. The role of medical care in improving life expectancy has been estimated by Bunker and colleagues (Bunker, Frazier, and Mosteller 1994). McGinnis and Foege reported that half of the deaths in the United States have significant roots in behavior decisions (McGinnis and Foege 1993), and Lantz and colleagues have shown that income and education are more important than some traditional risk behaviors in determining self-reported health status and physical functioning (Lantz et al. 2001). A recent volume of *Health United States* focused on income and education as contributors to health outcomes in that country (U.S. Department of Health and Human Services 1999). The importance of social factors has resulted in the development of the field of social epidemiology and a number of new books in this area (Berkman and Kawachi 2000; Amick et al. 1998; Adler et al. 1999; Marmot and Wilkinson 1999).

Most of these studies have considered the role of individual factors in relationship to health outcomes, but have not addressed the question of the relative independent effect of many variables across sectors acting in concert. A few investigators in addition to Grossman have attempted such analysis (Auster, Leveson, and Saracheck 1969; Hadley 1982; Cremieux, Ouellette, and Pilon 1999; Wolfe 1986; Machnes 1990), but much of this research is dated, and any new investigation is challenging because of the complexity of determinants, their interactions, their impact at different stages of the life course, and the lack of datasets allowing such analysis.

It is not our purpose here to review all the successes and failures of multidisciplinary research. There are similar and related barriers to the cross-sectoral research we advocate here. In fact, most, if not all, of the forces at work in most research environments are centrifugal, pulling scientists away from potential interdisciplinary collaborations (Kahn and Prager 1994). Beyond the substantial methodologic challenges addressed above, most researchers remain more comfortable and achieve more professional rewards within their own disciplines and sectors of interest. Theory, terminology, academic culture, and research funding streams favor unidisciplinary and unisectoral approaches. While there are successful examples of individual and program multidisciplinary and cross-sectoral efforts, these are challenging and remain the exception. Several notable efforts to overcome this are the MacArthur Foundation research networks in mental health and human development, the Robert Wood Johnson Foundation (RWJF) Scholars in Health Policy Research Program, and the RWJF new, broadly cross-sectoral Health and Society Scholars Program. The Population Health Program of the Canadian Institutes for Advanced Research may be the earliest and most prominent example in the field of population health (Evans and Stoddart 2003); over time its academic and policy influence not only stimulated cross-sectoral research, but helped achieve the result where more than 80 percent of Canadian health and social services officials were familiar with research about the impact of specific determinants of health on the health of populations (Lavis et al. 2003), although finance officials were much less informed, and remain a challenge.

In addition, attempting to determine relative cost-effectiveness across sectors has limitations beyond those of estimating cost-effectiveness in a given sector such as health care (Drummond and Stoddart 1995). There is also a need to differentiate between immediate and long-term impact that can be achieved by a particular intervention, since there are considerable political and cultural barriers to long-term intervention. Therefore, despite the growing general understanding cited above, there does not exist adequate knowledge and understanding about these factors and interactions to be practically useful in specific ways to policymakers in the public and private sectors who have responsibility for and are interested in such questions.

Nonetheless, there have been a variety of policy attempts to proceed with limited knowledge. In one of the few controlled socioeconomic experiments in health, a negative income tax program in Gary, Indiana, increased incomes of 1,799 eligible families to the poverty level from 1971 to 1974, with resulting birth-weight increases from 0.3 to 1.2 pounds in the income-supplemented group, thought primarily to be due to maternal

nutrition (Kehrer and Wolin 1979). In the Canadian province of Prince Edward Island, resources for multiple health-related programs were in 1993 combined into single budgets designed to encourage more effective resource utilization (Lomas and Rachlis 1997); a change of government in 1996 altered these arrangements but analysis about shifting resources among determinants continues (Eyles et al. 2001). In a recent "health accord" between the Canadian federal government and its provinces, \$2.5 billion of a \$22.5 billion agreement went to early childhood development (the remainder to traditional medical care, equipment, and information systems). In Great Britain, Health Action Zones were developed to allow for better integration across government sectors involved in health. Lurie cites several recent examples in the United States; "Safe Schools/Healthy Students" is a collaboration between the Departments of Health and Human Services, Education, and Justice to use preventive approaches for issues of drug use and violence, and the Department of Housing and Urban Development, Health and Human Services, and the Environmental Protection Agency set up a Child Environmental Health Task Force to deal with cross-cutting issues such as lead poisoning and asthma (Lurie 2002). Lurie also displays a comprehensive table produced by the Interagency Task Force on the Elimination of Racial and Ethnic Disparities, which characterizes the "Contributions of Various Government Departments to Leading Health Indicators from Healthy People 2010." There have also been global calls for intersectoral action in health; a 1997 World Health Organization (WHO) sponsored conference in Halifax identified intersectoral action a "cornerstone for health for all in the 21st century" and called for "a new global framework for sustainable human development...which considers the contribution of health and social programs to economic development and promotes complementary actions .... including globalization, environmental degradation, population growth, the health effects of global trade, and health system reform" (World Health Organization 1997). Even these examples are limited in that they do not depend on knowing the relative contribution of each determinant to health outcomes.

However, there is still extremely limited research or policy analysis adequate to assist decision makers to meet such challenges, in either their attempts to make the most appropriate decisions regarding health care budgets, or to consider the health impact of expenditures from sectors with no historical concern about health. We propose, therefore, a series of research and demonstration projects or activities with the following three purposes: (1) to encourage those within the health sector to think about health improvement

factors outside of this sector (such as the evidence on the extent to which health outcomes result from factors such as income, education, the environment, and social cohesion), (2) to help those outside of the health sector realize that health has associations and implications for the accomplishment of their sector-specific goals (such as establishing whether better health leads to workforce productivity improvement or whether increased spending for health assets is achieving regime stability in developing countries) (Kassalow 2001), and (3) to help those outside the health sector realize that their sector-specific goals and actions may have associations and important consequences for the health sector and health outcomes (such as how policy in the education of women affects their health and that of their children or how land use policy impacts on exercise and obesity).

We list below several categories of research and research-related activities that we think may help to elucidate these unanswered questions and increase awareness of the potential for better health coming from an appropriate investment strategy across the many sectors we consider.

- 1. Health Outcome Indicators.** In order to determine what cross-sectoral approaches are effective, we need to know what measures of health outcome we are trying to improve. Much more research and development is needed on health outcome indicators, such as the growing interest in augmenting national and local health accounting to address outcomes and processes of health, in addition to health care expenditures. Some summary measures like a health GDP may be useful, but only in relation to a family of leading subindicators, which are sensitive to nonmedical as well as medical determinants. Whether disease or condition indicators are more powerful policy motivators than more general measures of health outcome like overall mortality or health-related quality of life needs to be established. The recent controversy over the methods used in the WHO 2000 Report (World Health Organization 2000; Williams 2001) should be used to stimulate a decade of global investment to reach consensus on valid and useful measures.
- 2. Literature Review of Empiric Studies.** There is not a large empiric literature in economics or sociology on cross-sectoral comparisons, and what there is, is quite dated. In 1988, Joyce, Corman, and Grossman reviewed the literature on the cost-effectiveness of various health inputs and government programs in reducing race specific neonatal mortality (Joyce, Corman, and Grossman 1988). They

found early initiation of prenatal care to be the most cost-effective intervention and neonatal intensive care one of the least. Drummond and colleagues identified the cost per quality adjusted life year (QALY) saved for the caregivers of demented elderly who participated in a caregiver support program (Drummond, Mohide, and Tew 1991). In 1995, Tengs et al. identified the cost per life year saved from various injury reduction strategies across sectors (Tengs et al. 1995). Miller and Levy also evaluated cost-outcome studies for 84 injury prevention and control studies over a range of types of interventions from driver safety to road design to poison control (Miller and Levy 2000). The effect of homelessness on mortality rates in Canada and the United States has been investigated (Hwang 2001). O'Brien recently concluded that for firms in the United States, employer-sponsored health coverage seems to have contributed to employee productivity (O'Brien 2003). There is a need for a complete and current review and synthesis of such studies for all outcomes of interest and across all sectors, and identification of the most promising approaches as well as research gaps. Moreover, the academic reach for this review must go beyond traditional disciplines of the health services research and the policy sciences to include, for example, anthropology, community psychology, and ethics.

3. **Case Studies of Cross-Sectoral Impact.** Policymakers in both the public and private sectors say that case studies of successful or unsuccessful activity told in compelling ways often has more impact than decontextualized empirical results. We identified several types of case studies that would be useful. The first would be a complete review of published and fugitive (gray) literature that would compile in one place the full set of such recorded experiences. In addition, where it is known that significant positive or negative experiences have occurred, it would be useful to develop these stories as new cases.

A more specialized set of case studies would also be useful. For example, it could be that cross-sectoral activities are more likely to be effective if problem-focused such as on specific outcomes (infant mortality, chronic illness) than on the coordination itself without reference to a problem. To test this hypothesis it would be useful to have a number of case studies of both types to see if this hypothesis can be supported. Cases useful for this purpose would have to be problem- or nonproblem-oriented, have health outcome or reliable process indicators of health in the case, and show a positive or

negative impact. Moreover, such cases must take careful account of political and socioeconomic variables.

- 4. Determine How Policy Makers Use Information to Make Complex Intersectoral Decisions.** Perhaps drawing from such case studies, more needs to be known about how decision makers in the public and private sectors use new information in making decisions that necessarily are highly constrained. One senior policy-maker observed that he rarely has the leisure of considering multiple tradeoffs and certainly not the “health production function”—intersectoral health policy is usually the result of the after-the-fact effect of single policy decisions or, at the most, choices between two options. Van Hertten and colleagues (Van Hertten, Reijneveld, and Gunning-Schepers 2001) have suggested a “quick scan” process for analyzing the feasibility of any particular intersectoral health policy decision that includes balancing evidence, support, and tools for implementation; in the Netherlands, this approach suggests that improving public safety was a more feasible intersectoral health action than improving education. Advocacy of “health impact assessments” as tools for intersectoral policy evaluation need to be fully evaluated (Parry and Stevens 2001). Syme and colleagues list a series of political, professional, and organizational barriers to intersectoral action in the United States, all of which need to be further explored and established or refuted (Syme, Lefkowitz, and Krimgold 2002). Studies such as that of Fox and Oxman on Informing Judgment (Fox and Oxman 2001) and Lomas (Lomas 1997) illustrate how research-based knowledge does and does not inform policy decisions, as does work by the Canadian Health Services Research Foundation (Lomas 2000) and by Lavis on the role of health services research in public policymaking (Lavis 2002; Lavis et al. 2002). Much more exploration and testing of all such ideas is needed to guide intersectoral health policy decisions.
- 5. More and Better “Non-Health-Care” Economic Evaluation Research.** A fundamental concern is the relative cost-effectiveness of different approaches across sectors. While cost effectiveness research has been expanding in scope within sectors like the environment, most of the attention in the health sector has been limited to medical care. Funding agencies and academic institutions financing such evaluation should encourage work that includes the impact of non-health-care interventions as well as health care



interventions on the health outcome of interest. One way of framing these questions might be to examine the opportunity cost of overlooked investments in other sectors; Labonte, for instance, (Labonte 1990) examines what else could have been done in other Ontario sectors with medical care resources. Mooy and Gunning-Schepers have suggested that computer-assisted health impact assessments may be useful in answering questions such as which tobacco intervention has the most health gain or determining the relative gain from commuter cycling policy or promoting vegetable and fruit consumption (Mooy and Gunning-Schepers 2001).

6. **Develop More Individual and Longitudinal Datasets.** Many of the questions about causal impact of different sectors on health outcomes (such as the impact of education or schooling on mortality or morbidity) cannot be answered because of the complex interactions across sectoral inputs in the present and over time. While some inferences can be drawn at the group level, most require data at the individual level followed over time. Such longitudinal studies are very expensive and need to cover many years. But if they are a primary way to answer the questions we have raised, such investment needs to be made now so that future generations will be able to answer the questions more accurately. The U.K. medical and social research communities have a past tradition of large-scale studies of health status and associated factors, which reached a high level in the 1950s, such as the 1958 British Cohort Study. However these longitudinal studies largely fell out of favor in the 1970s, in part because of the high costs of conducting them. However, in the United Kingdom there appears to be a recent revival as academics have again accepted the value of studying large populations over time (Power, Manor, and Matthews 1999). The Canadian National Population Health Survey is leading efforts (<http://www.statcan.ca/english/IPS/Data/82M009GPE.htm>) which, along with the Canadian National Longitudinal Study on Children and Youth, need to be continued indefinitely; several more similar surveys need to be developed in different countries with sensitivity to national and local culture. The Americans Changing Lives (ACL) survey is another longitudinal effort that is beginning to yield intersectoral results (House et al. 1994). These existing as well as new longitudinal datasets need to be carefully examined to find patterns of determinants across sectors that are associated with or predict multiple health outcomes.

7. **Methods Appropriate for This Type of Research Need to Be Encouraged and Developed.** Even with existing datasets, better approaches like multilevel modeling and possibly portfolio analysis (the effects of asset allocation over time) might be useful. Policy-makers often find it useful modeling “what-if” scenarios in which the results of alternatives not taken are displayed (counterfactual conditional). Examples have been the impact of increased oil prices and seat belt legislation on traffic injury morbidity and mortality, and cigarette taxes on consumption. As mentioned above, the differences between correlation and causality need to be clearly communicated to policymakers, and ways found to increase the confidence that a relationship may approach causality.

This call for new and relevant knowledge is addressed to and one hopes will be responded to by those responsible for funding and setting priority for research expenditures. The same factors that impede the conduct of such research have impact on the overall funding climate for such work. However, the Canadian government has significantly increased research and data collection efforts recently, and has integrated the “four pillars” of health research (biomedical, clinical, health services/health policy, and population health) into a single umbrella funder, which may advance the cause of cross-sectoral research. In the United States, federal government agencies such as the Agency for Health Research and Quality (AHRQ), National Institutes of Health (NIH), and Centers for Disease Control and Prevention (CDCP), and state governments for state demonstration projects hold considerable promise, as do private foundations, including the new conversion foundations. There are also opportunities for international organizations such as the World Health Organization, the World Bank, and the European Community to take leadership in such investigations. What is needed is public and private investment of significant magnitude and longevity to make progress on an extremely challenging but critical research agenda. For this to happen, advocacy is also needed from policymakers in both the public and private sectors who have begun to think beyond medical care and health services to the broader issues and challenges of improving the health of the public.

The research community, including deans and department chairs as well as individual investigators, has responsibility as well. Often such multidisciplinary work encounters administrative barriers within research settings, and such applied work that by its nature departs from conventional science is often seen as risky for young investigators who are looking to tenure and

career development. Funding agencies as well as university officials and faculties must begin to revise policies and attitudes if we are to make more progress in the next decade in this area than we have in the previous two decades.

Finally, we clearly recognize that knowledge alone is not adequate to change policy. It is not the purpose of this article to review the substantial efforts underway to improve “knowledge-transfer” and “translating research into practice” activity and effectiveness (Canadian Health Services Research Foundation 1999; Agency for Health Research and Quality 2003). The importance of such questions and relationships needs to be made clear to decision makers and the public at large, so that there is demand created for such information that parallels the demand for more and better medical care. Compelling case studies, as mentioned earlier, are perhaps one of the best ways, as well as articles and electronic information that can keep the dialogue going. Research that originates in using organizations in partnership with academic centers also has promise. Mechanisms need to be found perhaps within existing policy and consumer organizations for the opportunities of a cross-sectoral focus to continue to receive attention.

We do not underestimate the challenge that making progress entails. We live in a society that values direct medical intervention that has immediate effect on our own health and those we are close to. There are many impediments to a broader perspective. They include: the resistance of the medical care sector; the territoriality of the public health sector; the bias toward looking at individual risk factors instead of population risk factors; the appeal of “identifiable” over “statistical” lives; and the lack of awareness in many of the non-health-sectors of the ways that population health status interacts with their own goals and responsibilities (e.g., if urban planners encourage walking to improve health, local retailers may benefit as well). The impact of nonmedical factors, many of which have their effects over long time periods, is less well appreciated, although there are common understandings (about air and water purity, for example) that can be built on. The data and methods that we have are not adequate to provide the convincing causal policy-relevant evidence that public and private decision makers can use with assurance.

But despite these limitations, there is a growing body of compelling evidence and experience that optimal health outcomes will not be achieved without a better balance in the medical and nonmedical determinants of health. Indeed, if these opportunities are appreciated and our call is heeded, we would expect the following outcomes by 2010:

- Many more studies will start from this different perspective, that is, how can health or a specific health outcome or problem be improved from the perspective of the multiple determinants across different investment sectors?
- A significant increase in the number of funded projects, research findings, and investigators working in this area;
- New interventions and pilot projects based on knowledge we already have or that is newly acquired;
- An increased number of governmental and business policies adopted that have a basis in cross-sectoral collaboration;
- Departments of health that adopt a broad population health mandate while enhancing traditional public health functions;
- Greater priority to population health among people in elected office and members of their immediate staff.

We believe the promise is great, but the time for many of these opportunities to have impact is long. Even with imperfect evidence, we must move ahead to include some of these not fully established approaches in our research portfolio. The likely result of not beginning much more cross-sectoral research and policy development is considerably less progress on overall health outcomes and distribution than we would want or can afford.

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